

EMBOLIC GANGRENE OF THE LEG AS A SEQUEL OF ACUTE LOBAR PNEUMONIA.¹

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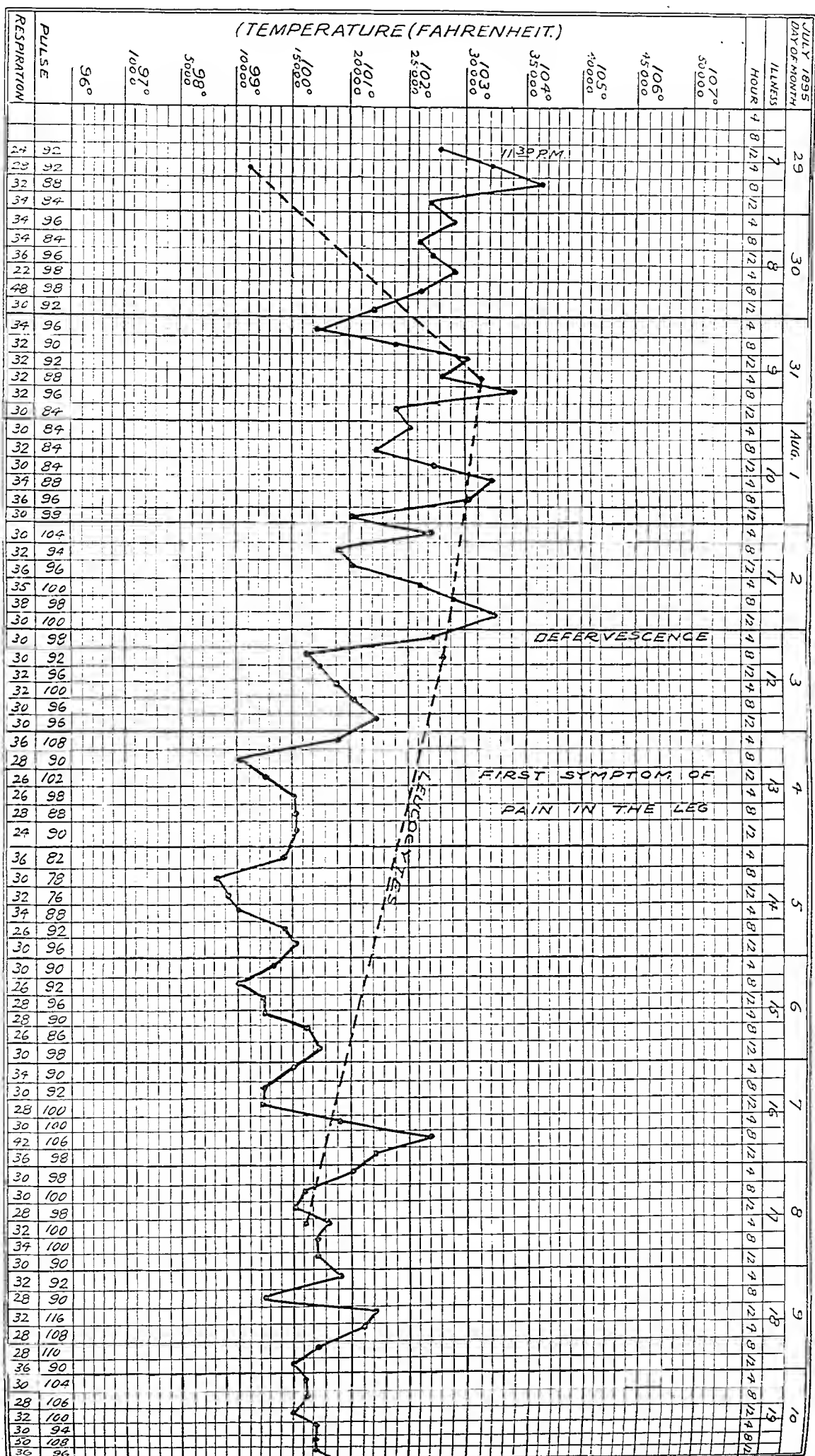
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THREE cases of gangrene of the leg developed suddenly in the course of acute lobar pneumonia have come under my observation. The phenomena in each instance have been quite similar, forming so typical a picture that I have felt justified in attempting to establish a direct connection between the pneumonic condition and the subsequent gangrene of the extremity. That is to say, I believe that a coagulum from the pulmonary veins draining the affected area was dislodged, and came to rest at a site—presumably the bifurcation of the popliteal artery—where it caused permanent arrest of the blood supply.

The histories of these cases are as follows:

CASE I.—Joseph L., aged sixty-seven years, a native of Switzerland, was admitted to St. Luke's Hospital, July 29, 1895. Previous history negative. Moderate user of alcohol. Seven days ago, chill and pulmonary symptoms. Examination shows pneumonia of right lower lobe; some signs also in upper lobe. Temperature, 104.2° F.; pulse, 88; respiration, 32. Expectoration viscid, blood-streaked sputum. August 3, the twelfth day of his illness, temperature dropped from 103.4° F. to 100.2° F., and to 99° F. the next day. August 4, the thirteenth day, noted "signs of consolidation over the lower part of chest have entirely disappeared." On that day he complained of severe pain in the leg. August 6, the right foot and leg very painful and tender on pressure and cold, especially the foot, which has a purplish hue. No pulsations perceptible in arteries of foot or leg. No swelling nor oedema. Repeated tests for sugar in urine have remained negative.

¹ Read before the New York Surgical Society, April 8, 1903.



August 9. Good color and temperature half-way down leg, end of toes black.

August 14. There is a line of demarcation of junction of lower and middle thirds.

August 16. Some dulness and a few râles over right upper lobe, otherwise negative.

He was transferred to the surgical service, August 19. Amputation through lower third of thigh. Arteries at site of amputation plugged. (Dissection of leg later showed the clots extending into the upper third of the tibials, below which the lumen was free.) Recovered well from the operation, but the wound broke down, apparently from insufficient blood supply.

September 30. Flaps reopened, three inches of femur sawn off, flaps trimmed and sutured. This procedure also failed to meet the indications.

October 28. Second revision, about two inches of bone being excised, amounting to an amputation through the upper third. Again the wound broke down. He developed melancholia, necessitating transfer to Bellevue, January 3, 1896. Since that time there are no data concerning his condition.

CASE 11.—Patrick J., aged forty-three years, married, cab-driver, was admitted to the medical division of St. Luke's Hospital, January 9, 1902.

Previous History.—Fracture of right leg seven years ago. Beer and whiskey drinker all his life. No specific history, no diabetes.

Fifteen days before admission, chill followed by pulmonary symptoms, developing into pneumonia. Defervescence on the seventh day, when he felt a sudden numbness in the left foot from the ankle down. He soon entirely lost sensation over this area, and it felt very cold to the touch, but was not swollen. Two days later experienced severe pain and tenderness in the popliteal space, in the calf, and over the anterior aspect of the leg below the knee about half-way between the knee and just above the area of numbness. This pain has continued unrelieved, and two days ago he noticed some discoloration over the anesthetic area, particularly the toes, which has since increased rapidly.

Examination of chest shows only the signs accompanying resolution of a pneumonia of the left lower lobe. The left leg is swollen from pelvis down. The inner and under surfaces of foot

are cold, becoming gradually warmer up to the knee. Pressure on the leg is very painful. Below ankle all sensation is lost. Temperature ranges around 101° F. No glycosuria.

When I saw him at this stage, I was in favor of immediate operation; other views prevailing, the case passed from my observation.

January 21. "Area of cold has advanced up the leg for about two inches, the redness and pain to the middle of the leg."

Operation, January 24 (twenty-two days from first sign of obstruction), by Dr. F. W. Murray. Gas and ether anesthesia, amputation through the condyles, which was well borne with the aid of free stimulation and a saline infusion.

February 4. "Edges of both flaps have broken down. Two sinuses with sloughy edges pass down to the bone."

February 26. "Sinuses closing down."

March 6. Discharged nearly healed.

Examination of the amputated leg showed a clot beginning in the popliteal artery and extending a short way down in the tibial arteries.

CASE III.—Mr. E. B., aged sixty-one years; lawyer; seen in consultation with Dr. Chapman, October 8, 1902. Previous history negative. Twenty-six days previously, sudden pulmonary symptoms developing in lobar pneumonia, right lower lobe. He had defervesced and was in good condition, when, twelve days previous to my seeing him, he had a sudden attack of numbness and intense pain in the left leg, and it was found that he had no sensation in his toes. Two days later the toes and leg had become markedly discolored, extending in a lesser degree up to the knee. Sensation being also lost and diminished.

When I saw him, there was a typical dry gangrene with well-marked demarcation at the middle of leg. Except for some moist râles over the right base, the lung was clear. His general condition was rather below par. His pulse was 88 and soft; temperature varying around 101° F.; respiration, 20. Urine, 1020, heavy trace albumen, no sugar.

Operation at St. Luke's Hospital, October 10. Gas and ether anesthesia; a saline injection into the brachial vein started simultaneously with the operation. A rapid circular amputation through the lower third of the thigh was at once extended two inches higher, owing to the bloodless condition of the limb; even

at this higher level, most of the vessels, large and small, were plugged. The flaps were brought into loose approximation, a packing of sterile gauze intervening.

The operation was well borne, and the amputation wound healed slowly, but without necrosis or infection. His general condition was never satisfactory, and it was two weeks before the temperature became normal. Ten days previous to his death, he passed into an apathetic condition, and finally died six weeks after operation, with symptoms of progressive cardiac exhaustion. No dissection of the leg was permitted.

The symptoms of vascular obstruction seem to have developed in all three cases suddenly at or about the time of defervescence. The gangrene of the leg was on the same side as the pneumonia; but no significance is attributed to this fact. None of the cases showed any obvious kidney or cardiac changes, nor did the urine contain sugar. The previous histories showed no features of possible interest as etiological factors.

Such cases of gangrene as have just been described, occurring suddenly in the course of a pneumonia in previously healthy subjects, are admittedly rare. Welch alludes to Osler's having seen one such case due to embolism. I have asked a large number of practitioners as to their experience in this matter, with negative results. I have made as yet no systematic attempt to investigate the subject, but since 1895, when Case I occurred, have been on the lookout for some reports of similar experiences, without coming across any in the literature.

My belief that these cases were directly due to the pneumonic condition, and not to some other intercurrent or accidental process, are based chiefly on the following circumstances:

That a pathological condition accompanying pneumonia which would explain the purely mechanical process is stated by Welch to exist.

That the gangrene was of the dry form due to blocking of an artery.

That the typically sudden onset of symptoms was in favor of an embolism rather than a thrombus, beginning in the arteries of the leg proper.

That the patients showed no obvious vascular and cardiac lesions favoring the theory of the transferring to the leg of an embolism originating in such process.

That the age of two of the patients, sixty-one and sixty-seven, does not give greater weight to the theory of thrombosis due to senile changes, because I am able to cite two cases of sudden cerebral manifestations following pneumonia occurring in healthy men of thirty-five or thereabout.

In addition, it may be said that even if this theory of a direct mechanical sequence can be reproached with having lapses that prevent its entire acceptance, it is open to fewer such objections than any that may be offered in opposition.

With regard to the conditions at the site of the pulmonary lesion which may possibly give a direct origin to the embolic process, the evidence, it must be confessed, is meagre. Pathologists with whom I have conferred deny ever having observed any such thromboses of the veins necessary for this explanation. If existing, it must undoubtedly be exceptional, and it is possible that, in the absence of systematic observation of this point, its infrequent occurrence may have been overlooked, and we may yet have confirmations of the views here expressed. I find in Welch's article on "Thrombosis," in Albutt's "System of Medicine," Vol. vii, page 160, this statement :

"One sometimes finds in inflamed areas, less frequently under other conditions, the vessels, particularly those of small caliber, partly or completely filled with fibrillated fibrin, presenting such an arrangement and configuration as to indicate coagulation during life. . . . In croupous pneumonia such fibrinous masses are regularly present both in the capillaries and larger vessels of the hepatized area. These purely fibrinous coagula are of anatomical rather than clinical interest."

With regard to the possibility of the gangrene being due to localized arterial disease, while this view has to be enter-

tained, there is little to be said in favor of it. The most prominent argument, that two of these cases were over sixty years of age, is not enough. Such localized changes come for the most part considerably later in life. The starting-point is often referred to traumatism, and the history is that of a gradual process, that is, a slowly progressive thrombosis, contrasting sharply with the acute manifestations just described, which it seems more reasonable to refer to an embolic process.

Moreover, there is direct evidence in two of our patients that such was not the case, in that the clot only extended a short distance into the tibial vessels. Assuming then for granted that we have to deal with an embolic occlusion of the arterial supply, we come to the question of its possible origin in other portions of the arterial system. We are at once confronted with the fact that such possibilities do exist in many and varied forms, and the theory of probabilities would give the preference to such an origin rather than the apparently remote one which I have favored. Two of the patients come within the later periods of life, when cardiovascular degenerations chiefly occur, though, as a fact, most of the severer manifestations are developed at a still later period. Such people, for the most part, show either symptoms or visible external evidences,—thickened vessels,—not presented by my patients; although it is admitted that very considerable local changes may exist without these general manifestations.

We have also to consider the formation of cardiac thrombi, whose occurrence might be favored by the cardiac strain resulting from the pneumonia.

True cardiac thrombi are quite rare, and, if due to the pneumonia, should occur more particularly in the fatal cases when the heart flags, whereas those cases described were not of extraordinary severity, and the fact of their recovery is rather against such a theory. None of these cases presented signs of valvular lesions, so I doubt if the cause of the embolism can be ascribed to the transference of the vegetations which occasionally accompany such lesions. It does not seem

necessary to consider the possibility of so-called malignant endocarditis.

While admitting that these cases may be explained by the accidental manifestations of intercurrent previously existing cardiovascular changes, I prefer to hold to what seems to me the reasonable theory of a direct sequence of events referable to the pneumonia, with the hope that by calling attention to such a possibility others may be induced further to study these points.

The experience acquired in these cases furnishes the opportunity of considering some practical points in regard to when and where to amputate.

Shall we amputate while there is any active pneumonic process, and can there ever be sufficient urgency to require such interference before complete resolution of the pulmonary process?

Shall we wait for the establishment of a line of demarcation, or is it desirable to anticipate its formation?

These questions can be best considered by settling the question whether we shall ever anticipate the formation of a line of demarcation. My own feeling is *not* to wait, if the pulmonary condition favors intervention, in the belief that, even with the formation of a line of demarcation in the mid-leg, it will generally be better judgment to amputate above rather than below the knee. Moreover, the early operation might save more of the leg, assuming that the tendency of the clot once formed is to progress upward, as was shown in Case I, quite rapidly, and would have perhaps required properly to overcome it an amputation at the hip-joint. The extension of the clot and the promptness of re-established compensatory circulation cannot be accurately gauged, while the pulmonary condition can be more definitely ascertained. Therefore I should say, on general terms, wait till the lung condition allows, and then amputate without further delay. All three of these cases stood the operation well.

As regards the anæsthetic, spinal anæsthesia for those who choose to use it would seem to meet the conditions admirably. I prefer for general anæsthesia the risk of irritating

a damaged lung with ether to that of inviting collapse from chloroform of a heart enfeebled by a severe sickness.

With regard to the site, one should not be deterred from amputating at a point where the vessels are found obstructed by thrombi, because it is self-evident that the nourishment of any one point comes from a higher level. One will be guided by previous observation of the condition of the limb at the point of incision, that is, its degree of warmth and the activity of the return circulation after temporary local ischaemia from pressure of the finger. If, on division, the skin oozes freely, one may safely amputate at that point; if not, reamputate till this requirement is satisfied, even if the other tissues do not seem to respond to the same degree.